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Establishment of Payment for Forest Ecosystem Services (PES) Scheme For To Support Local Livelihoods In Bentong, Pahang, Malaysia.

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ABSTRACT
Forest ecosystems provide a range of services that are of fundamental importance to human well-being, health, livelihoods, and survival. As development increases with demand for natural resources, more forest lands are replaced with agriculture land, commercial plantation and infrastructures for being able to accommodate the excessive growth of the world's population. JandaBaik, Bentong, Pahang is one of the popular recreation and ecotourism sites in Malaysia. Apart from being surrounded by a forest reserve, JandaBaik possesses beautiful forest landscape and forest ecosystems. With the increasing demands for other forms of forest land use, multiple efforts are imperative to support forest management and sustain the forest resources without compromising the livelihoods of the local communities. Therefore, this study aimed to estimate the economic value of environmental services and to establish the Payment for Ecosystem Services (PES) scheme for the local communities in Janda Baikas financial incentives to be involved in environmental conservation. The contingent evaluation method (CVM) that involved double-bounded dichotomous choice was used in this study. A face-to-face survey, which involved 322 visitors, was conducted in 2018. The estimated mean of WTP for conservation from various models ranged from RM 17.00 to RM 30.00. The results of the community-based PES scheme proved its beneficial contributions to the local communities, the state revenue, and the sustainable conservation of forest ecosystems.

Keywords
Ecotourism; forest landscape; livelihoods; payment for ecosystem services; willingness to payMalaysia

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I. Introduction

Forest management has recently shifted from the conventional conservation and restoration practices to a more dynamic approach for sustainable management. This shift takes place because the capacity of forest resources continuously weakens in order to provide goods and services that are fundamental to the livelihoods of local communities. Human activities and other factorshave threatened the forest ecosystems, especially in developing countries like Malaysia. Addressing this phenomenon, the MalaysianGovernment has continuously intensified efforts to reduce forest loss due to the forest clearance or the conversion of forested lands to other landuses, the converting forest areas for agricultural purposes and to other land use changes. Based on this scenario, introducing the payment for ecosystem services (PES) schemeis deemed fitting.

Moreover, the concept of ecotourism development has become increasingly popular in Malaysia (Manohar et al., 2020). With its promising prospects, ecotourism development in terms of the development and conservation of forests providesvaluable opportunities that benefit the local communities Wood et al., (1991). Awell-planned and properly managed ecotourism programme can providesustainable returnsfor the local communities. Therefore, the PES scheme is deemed as one of the most effective solutions to achieve the following two aims: (1) to generate financial support for the local communities; (2) to conserve the forest ecosystems(Wunder 2005).

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Studies on PES in Malaysia are primarily at the conceptual and pilot stages. Mohamed *et al.,* (2012) study on watershed conservation at Hulu Langat Selangor. Krishnan et al., (2017) studied household involvement in pioneering PES in Langat River Basin. Abdulkarim et al., (2017) studies about the PES scheme on water conservation for agriculture irrigation in Peat Swamp Forest, Selangor and Zaiton et al., (2020) also study on the concept of PES on watershed conservation for domestic water in Perak. Therefore, this study not only focuses on valuing ecosystem services but develops the PES scheme for forest conservation and ecotourism benefit to the local community. Furthermore, due to the Author's knowledge, this study was the first attempt to implement the PES Scheme in Malaysia.

Thus, the current study aimed to estimate the economic value of environmental services and to establish the Payment for Ecosystem Services (PES) scheme for the local communities in Janda Baikas financial incentives to be involved in the environmental conservationis to establish the Payment for Ecosystem Services (PES) scheme in creating financial incentives. Focusing on the Ulu Tampik Waterfall (UTW), which is one of the nature ecotourism sites in Malaysia, this study consisted of two phases. The first phase focused on estimating the values of environmental services or to determine the price to be paid for environmental services, while the second phasefocused on thedevelopment of the PES scheme in terms of design and implementation.

II. Materials and Methods

2.1 Description of Study Site

Ulu Tampik Waterfall (UTW), which is located at Janda Baik, Bentong, Pahang, Malaysia, was selected as the study site. This location is an approximately 45-minute drive from the city centre of Kuala Lumpur. The surrounding area of UTW in Compartment 51, Lentang Forest Reserve (LFR) is generally unique, and it serves as an exciting recreational area. In terms of topography, this study site is located within the Titiwangsa Range.LFR is a hilly area, with an altitude between 600 m and 800 m above sea level.The main physical element of LFR is its unique, clear waterfall.UTW and its surrounding areapresent a popular leisure site for the residents of Janda Baik and visitors, both locals and foreigners (**Figure 1**).

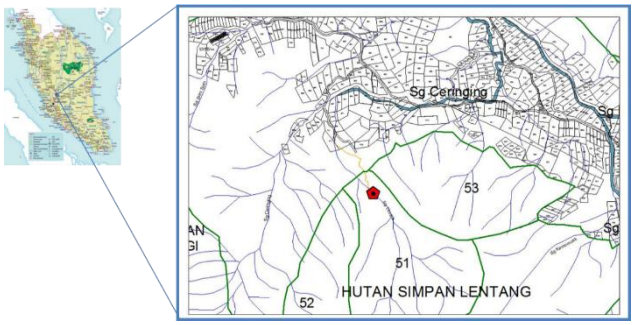

Figure 1. Location of Study Site at Janda Baik, Pahang

2.2 Estimation of the Economic Valuation

As previously highlighted, this study consisted of two main phases.The first phase involved the economic valuation of the study site as a nature tourism area. The economic benefits of preserving the study site was estimated based on the public preferences. In particular, this study measured whether visitors would pay for the conservation of natural resources. Meanwhile, the second phase of this study focused on the development of the PES scheme. This phase first explored the involvement of the local communities in managing the project area, assisting in the conservation activities, and improving their livelihoods.This phase also focused on developing organisations at the community level that can be actively involved in the management of the project area.

The contingent evaluation method (CVM) was used to quantify public preferences.Through this method, the net economic value of non-market goods and services to individuals can be quantified by measuring the consumer surplus (Walsh, 1986). The "willingness to pay" (WTP) for the conservation of natural resources, which serves as an indicator of demand, was also used.This method enables people to express how they would act if they were to be placed in certain contingent situations. As for the current study, the maximum WTP to preserve UTW was determined.

In particular, the double-bounded dichotomous choice was used in this study.This format provides a single dollar amount offer and a simple response of either "yes" (take it) or "no" (leave it). The obtained responses were measured as this study's dependent variable, with the dollar amount (WTP) for the changing environment and other relevant data as the independent variables. There were four models on the estimation of WTP for each sample.

2.3 Questionnaire Design and Sampling Procedure

A structured questionnaire survey was used in this study. The developed questionnaire survey was designed and divided into four sections.CVM that involved double-bounded dichotomous choice (DBDC) format was applied. This particular format allowed the respondents to choose the amount of WTP. All respondents were also required to indicate "yes" or "no" for the question related to WTP.The question presented six different bid prices for the respondents to select: RM2.00, RM5.00, RM8.00, RM10.00, RM15.00, and RM20.00.

For sampling, this study applied the non-probability convenience sampling strategy to obtain insights from a broad population perspective.The face-to-face survey, which involved 322 visitors, wasthen conducted in 2018. All respondents were first briefed on the purpose and objectives of the survey prior to answering the questions.

2.4 Development of PES Scheme

This study adopted the appreciative inquiry (AI) process as a research tool to explore how community involvement in the management of natural areas can improve theenvironmental conservation and livelihoodsof local communities and further develop the community-based PES scheme (**Figure 2**).The design and development of the PES scheme in this study involved a series of workshops and panel discussions. This approach is suitable for collectivist societies where each member mainly interacts with the members of a specific religious, ethnic, or familial group, and they feel involved in the lives of other members of their group (Greif, 1994).

This study's AI process involved a few steps with certain modifications, which incorporated five phases: grounding phase, discoveryphase, dreamphase, designphase, and destinyphase. Firstly, the grounding phase involved the inception phase that consisted of rapport building, stakeholder identification, selection of participants, and orientation on this study's objectives and methods. Secondly, in the discovery phase, the selected participants were required to discuss and identify (in terms of clear boundary) UTW and its surrounding area to preserve and be managed or maintained by the local communities as a community-based PES project. Thirdly, the dream phase involves co-creating a shared image or vision of the preferred future. All participants were required to discuss and visualise the ideal relationships they wouldexpect forthe livelihood, conservation, and tourism programmes. Following that, the design phase serves as the process of drawing community socio-technical architecture to achieve the "dreams". Lastly, the destiny phase addresses how to empower, learn, and adjust or improvise.It represents the time of realising the "dreams" due to work done in the design phase, as well as the moment of continuous learning, adjustment, and improvisation.For the current study, this phase served as the existence phase of the community-based PES scheme and physical translation of its existence.

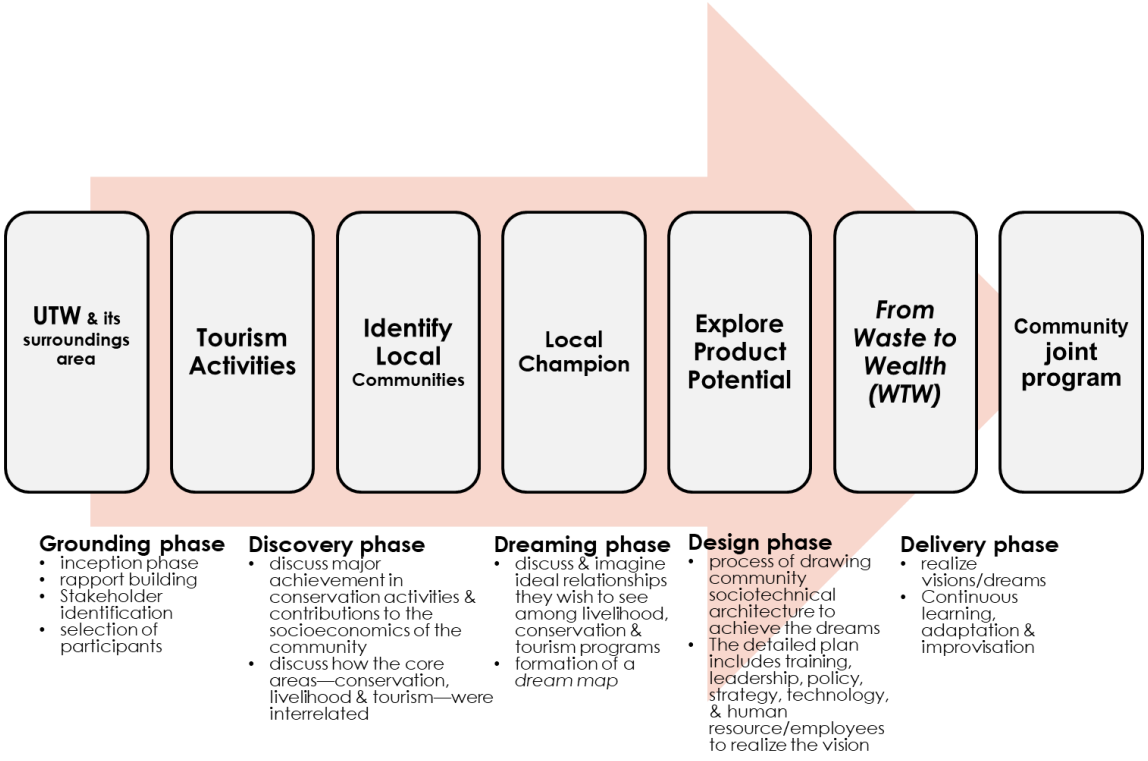

Figure 2. Illustration of the Phases and Processes of a Community Development Programme

III. Results and Discussion

This section presents and discusses the obtained results of this study into foursubsections.Thefirst subsection presents of the results of the economic valuation study using CVM. Meanwhile, the second subsectiondiscusses the development of financial incentives for the local communities in environmental conservation, focusing on the conservation of natural resources. The third subsection deliberates the institutional and legal framework of the community-based PES scheme and its implementation with the active involvement of the local communities. The economic contribution and its impact on various stakeholders through the development and implementation of this community-based PES scheme are discussed in the final subsection.

3.1 Estimation of the Mean of WTP

In this study, the mean of WTP was estimated based on Logistic and Bivariate Probitmodels. **Table 1** presents the calculated mean and median valuesaccording to these different approaches. The estimated mean of WTP recorded RM23.05. As for the Bivariate Probit model, the mean of WTP ranged from RM23.83 to RM30.89, which was slightly higher than the recorded mean of WTP for the Logistic model.

Table 1. Means and medians of WTP for different models

Model		**Mean of WTP (RM)**
Logistic	Initial bid	23.05
Bivariate Probit	Initial bid	23.83
	Follow-up bid	30.89

The aggregation of WTPs for the conservation of UTW for recreation and ecotourism was determined based on the resultant outcomes of the multiplication of individual WTPs with the number of visitors to UTW.**Table 2** presents the yearly calculated conservation values or benefits for UTW based on the mean of WTP forthe respective models.

Table 2. Estimated benefits (in RM) for the conservation of UTW for recreation and ecotourism based on the mean of WTP fordifferent models

Estimated Number of Visitors to UTW (in 2018)	**Logistic**	**Bivariate Probit**	
	Initial bid	**Initial bid**	**Follow-up bid**
	WTP = 23.05	WTP = 23.83	WTP = 30.89
4,800	110,640	114,384	148,272

3.2 Determination of the Marketable Value

The price for an ecosystem service is ultimately determined by what the buyer is willing to pay and what the seller accepts and delivers.In regulated markets, WTP is often mandated. Meanwhile, in voluntary PES deals, WTP is open to negotiation. Based on the results of the economic valuation study, the values ofWTP rangedfrom RM12.51 to RM30.89 per person per visit (**Table 2**).

The obtained results showed high economic value for the environmental conservation activities of UTW among the participating visitors who came for the purpose of leisure or recreation.Using the estimated data on the number of visitors to UTW in 2018 (n = 4,800), the aggregate value was expected to be between RM60,048.00 and RM148,272.00 per year. The promotion and future development of basic facilities were expected to increase the number of annual visitors. In other words, visitors do not mind paying a certain amount of entrance fee if the UTW and its surrounding area are protected and preserved for the benefits of the present and future generations.

3.3 Institutional and Legal Framework of PES Scheme

A part of the Tampik river basin, Janda Baik, Pahang (30 hectares), is leased and managed by the local communities under a local community group, specifically Sahabat Alam Tampik Janda Baik(SATJB) Association. As for the current study, Pahang Forestry Department cooperated with SATJB Association for the implementation of"joint management"to manage the UTW environment.The developed concept of joint management and benefit-sharing is presented in **Figure 3**. In particular, the members of SATJB Association were assigned to a community-based PES project of managing the recreational and ecotourism activities at the 30-hectare UTW environment in the Lentang Forest Reserve.

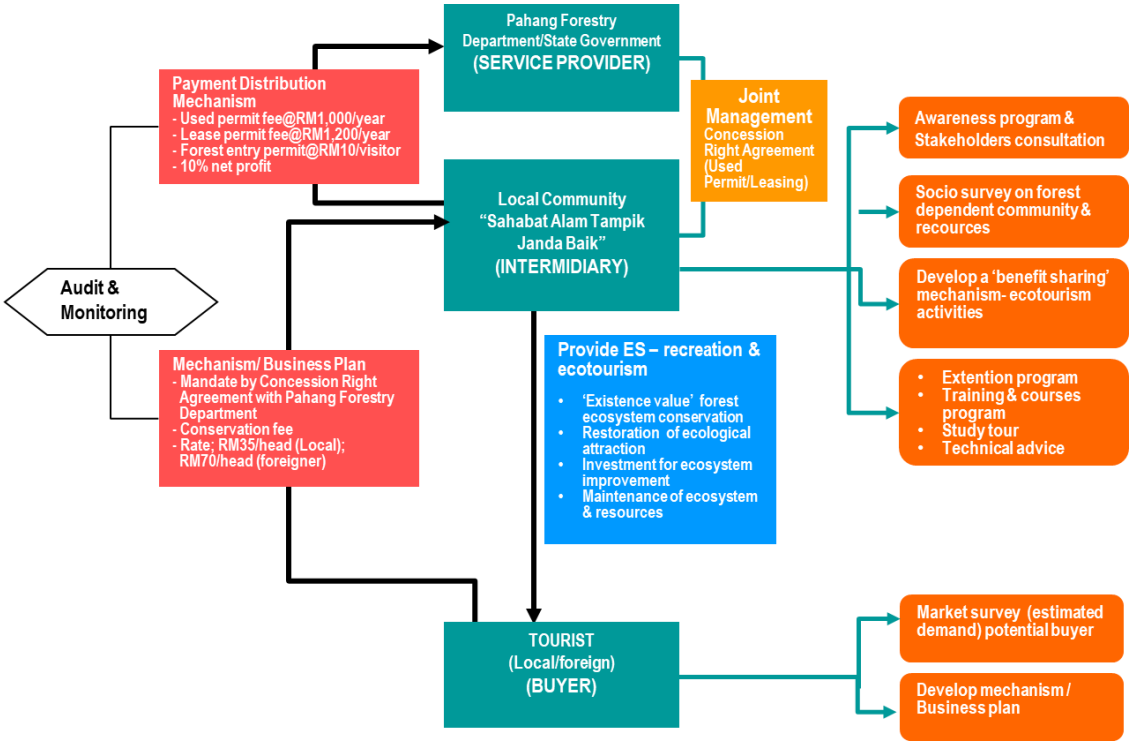

Figure 3. Joint Management and Benefit-Sharing Between the Pahang Forestry Department and the Local Communities in the Community-Based PES Schemefor UTW

3.4 Economic Return of the PES Scheme Development—Preliminary Findings

The economic impact of the environmental development of UTW, as a community-based ecotourism project under the PES scheme, on the local communities, specifically the involved members of SATJB Association can be observed in terms of household income and job opportunities.The participating members of SATJB Association received income for their involvement. The ecotourism activities in the UTW environment under this project provided job opportunities and improved the socio-economy. For the management of the UTW ecotourism area, 20 job opportunities were available, including administrative work and fieldwork. Most of these job opportunities were of part-time.

In the first year of operation (with an estimated capacity to operate for 10 months in 2018), SATJB Association was estimated to generate a total gross income of RM153,650.00.To a certain extent, this amount benefitted the participating members who were involved in the ecotourism tour packages. Based on the actual number of visitors, a part-time worker was estimated to earn (ancillary income) of RM477.00 per month.A direct employeecan earn up to RM800.00 per month.This revenue estimate was determined based on the average number of 439 visitors per month.

The local community group that operated UTW as a community-based PES project was charged with Used Permit Fee and annual lease fee. Besides that, 10% of the net profit must be remitted to the State Government. Based on the financial cash flow of the SATJB Association from August 2020 to November 2020 (fourmonths of operation), the Association made a payment of RM20,280.00 to the Pahang Forestry Department and State Government. However, in early 2020, the Association was unable to carry out full operations due to the Movement Control Order (MCO) imposed by the Malaysian Government.Under normal circumstances, the project can contribute up to RM47,330.00 per year (based on10-month operation in one year) as state revenue.

IV. Conclusion

The current study developed a community-based PES scheme for UTW, which can generally strengthen the community-based practices of forestry activities.The developed PES scheme successfully serve as a development strategy to help improve the socio-economy and livelihoods of the local communities and contribute to the sustainable conservation of forest ecosystems.This effort clearly supports the sustainable use of natural resources with respect to the sustainable development goals and national development policies in environmental and forestry management.

The introduced PES scheme is one of the initiatives and strategies that can improve the efficiency of forest management and biodiversity resources through active involvement and cooperation of the local communities. Undersuch initiative, the active participation of the local communities can reduce environmental

damage and restore forest areas.This study highlighted innovation in a community-based PES scheme involving ecotourism and ecosystem services to support the country's sustainable forest management (SFM). This study proved that effective management under the proposed community-based PES scheme can elevate the socio-economic conditions of the local communities andcontribute to the sustainable conservation of forest ecosystems and state revenue simultaneously.

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